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RON CURRY
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Memorandum

To: LaDonna Turner, Site Assessment Manager
Technical and Enforcement Branch
U.S. Environmental Protection Agency, Region 6

From: Dana Bahar, Manager, Superfund Oversight Section
Ground Water Quality Bureau, New Mexico Environment
Department

Date: August 16, 2010

Subject: Pre-CERCLIS Screening Assessment of the Johnny M mine
(Grants Mining District), McKinley County, New Mexico:
Further action under CERCLA recommended

Site name	Johnny M mine	Alternative names	not applicable
Street address	not applicable	City	not applicable
Zip code	not applicable	State	New Mexico
		County	McKinley
Latitude	35.361959	Longitude	-107.721956
		TRS	T13N, R8W, s. 7 and eastern half of s. 18

Site physical description:

Features currently at the Johnny M minesite ("Site"), as documented during New Mexico Environment Department's ("NMED's") inspection on July 26, 2010, include a metal half-cylindrical overhang (see P1, P2 and P10), at the back of which is a partially-collapsed elevated wooden platform and a locked vault door (see P15). According to the property owner, Harry Lee, the vault now safeguards artifacts that have been collected from the Floyd Lee Ranch. Additionally, the Site includes several concrete pads (see P8, P11 and P16), several subterranean cylindrical metal vaults and vertical pipes—most of which contain pipes (see P14) and some of which are only partially covered with metal plates (see P4 and P5)—and a fenced former substation with 5 presumed former transformer pads (see P7). The Site is located within a steep-sided valley (see P10 and P12) that broadens considerably toward its mouth, opening into the broader valley of San Mateo Creek ("SMC;" see P13). A predominantly straight drainage, in which concrete debris (see P8), pipes, and wires are exposed, trends southeastward in the direction of SMC; this may be the former dewatering ditch/pipe that is discussed below. The floor of the valley is mostly very flat and appears to



have been graded. Two of the concrete pads include large diameter circular features, one of which has a protruding open pipe (see P11); these circular features may be the locations of the former mine shafts, and the protruding pipe may be the location of a ground water monitoring access point that is referenced in NMED documents from the time of Site reclamation. There are abundant pieces of thin wire exposed in the soil around the Site, and one blasting cap was identified by a member of the State inspection team. Additionally there are small amounts of iron and wood debris scattered around the Site (see P6).

The Site is accessed from state highway 605 through the Floyd Lee Ranch via unpaved roads. State personnel did not attempt to drive all the way to the mine site, although this appears to be possible with 4-wheel drive. Another old road leading from the mouth of the valley toward state road 605 now ends at a locked gate at the Floyd Lee Ranch property boundary.

Site identification:

The Site is one of numerous former uranium mines within the Grants Mining District.

Site summary:

Ore in this mine came from the Poison Canyon tongue of the Brushy Basin member, which overlies the main Westwater Canyon member of the Morrison Formation by approximately 25 feet ("ft"), and also from a zone near the top of the Westwater Canyon member. The depth of the ore-bearing horizons was between 1300 and 1400 ft below ground surface (Ref. 1, p. 1). The ore-bearing zone originally was saturated, but did not resaturate once drained, despite being below the water table (Ref. 3, p. 2). Analysis of ground water chemical data indicates that leakage from the overlying Dakota Formation into the Westwater Canyon has occurred at this mine, which is attributed to ore-body dewatering, despite separation of the two formations by a thick shale sequence (Ref. 2). Discharge plan application DP-20 references current discharge of approximately 1 millions gallons per day ("gpd") to two settling ponds and thence to SMC via a one-mile open ditch across Section 18 that was to be replaced by a 12-inch pipe (Ref. 3, p. 3). Each of the ponds was approximately 100 ft by 400 ft by 15 ft deep, and was constructed subgrade between the base of the Gallup formation and the top of the Mancos Shale. The discharge plan was submitted to the New Mexico Environmental Improvement Board prior to March 27, 1978 (Ref. 3, p. 1), and approved on June 16, 1978 for a five-year period by the New Mexico Environmental Improvement Division ("NMEID") Water Pollution Control Section (Ref. 4). Operations also were conducted under Radioactive Materials License NM-RED-MB-00 (Ref. 5). A map accompanying the discharge plan indicates that the pipe was to lead to an arroyo which then flowed to SMC in Section 19 (Ref. 3, p. x). The area to which discharge occurred was covered by 50 to 80 ft of alluvium and underlain by Mancos shale (Ref. 3, p. 3). Extracted ground water was treated prior to discharge to the ponds by the addition of Nalco 8114 coagulant and a solution of 25% BaCl₂ by weight (Ref. 6). Subsurface monitoring of the discharge routing above the Mancos Shale was provided by two monitor wells—GW-7 and GW-8; two other monitoring points—MW-1 and MW-2—also provided monitoring of the surface discharge. A total of eight monitoring locations are referenced for the Site in the application (Ref. 3, p. 4).

The mine shaft was sealed with a four-foot thick water ring reinforced concrete plug set between the Dakota and Westwater members, and installation of a 12-inch thick reinforced

concrete plug with a 20-inch diameter capped steel pipe into the portal (Ref. 7 p. 1-2). Additional proposed reclamation activities included debris burial, partial filling of ponds with waste rock and completion with borrow materials, reconstruction of water diversion into the “old arroyo,” and undercutting of waste pile toe.

Backfilling of mine stopes with tailings from the Kerr-McGee mill (now the Ambrosia Lake/Rio Algom mill), where the ore from the mine was processed, was begun in 1977 (Ref. 8, p. 56). Two one-acre areas were utilized at each of 2 surface injection locations for temporary storage of the uranium tailings. An estimated total of 286,000 tons of tailings were slurried into the mine at a depth of approximately 1100 to 1300 ft (Ref. 7, p. 1).

Ranchers Exploration and Development filed notice of its intent to cease mining at the Johnny M mine by mid-February, 1982 (Ref. 9), and site reclamation was underway during a site visit later that year (Ref. 10). NMEID sent a letter to Hecla Mining Company on April, 2, 1985 (Ref. 11), which extended the force of Radioactive Materials License NM-RED-MB-15 through amendment, due to persistent elevated exposure levels at both the North and South vent hole area backfill sites.

Ranchers constructed a monitor well into the Westwater Canyon ore horizon through the north vent hole shaft in order to monitor potential water quality impacts from backfilled tailings during resaturation following mining cessation (Ref. 12). A ground water sample collected from the mine on June 19, 1985 indicated that only manganese exceeded then-current NMWQCC standards (Ref. 13). The Nuclear Regulatory Commission (“NRC”) sent notice to Hecla Mining Company in 1993 of the termination of source material license SUA-1482 for the Johnny M Mine (Ref. 14).

Approximately 2 million pounds of uranium oxide (“U₃O₈”) were produced from the mine, and approximately 1.5 million pounds are estimated to remain (Ref. 1, p. 1).

Targets:

Potential impacts to the alluvial ground water system during site operation may have occurred from ground water discharges from mine workings to settling ponds and the SMC drainage. Some portion of discharged contaminants may adhere to sediments, and propagate episodically downgradient in response to streamflows within the SMC drainage. Current details of alluvial ground water flow are unknown, but are thought to follow general topographic slope (i.e., locally southward from the Site, and generally westward in the direction of surface water flow). Such alluvial ground water impacts may also propagate into underlying bedrock aquifers through stratigraphic, structural, and/or anthropogenic (e.g., leaky wells, mine shafts) interconnections. Additional contaminant mobilization in ore-bearing Westwater Canyon Formation could result from oxygenated ground water influx resulting from progressive basin recharge following cessation of mining activities. Site-originated impacts also may have occurred from wastes remaining on-site.

Wells that are registered with the New Mexico Office of the State Engineer and located within a 4-mile radius of the Site are shown in the table following (Ref. 15).

Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
0 – 0.25	B 00390	FERNANDEZ CO. LTD	IRR	12/31/1974	1800	900	6.63	850.0
0.25 – 0.50	B 01544	(b) (6)	DOM	06/14/2003	715	624	5.0	6.0
0.50 – 1.0	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00848	KERR-MCGEE NUCLEAR CORP. MIN		05/14/1981	1611	1315	4.5	
	B 00848	KERR-MCGEE NUCLEAR CORP.	MIN		0	0		
	B 00851	KERR-MCGEE NUCLEAR CORP	DEW		0	0		
1.0 – 2.0	B 01084	FERNANDEZ COMPANY	STK	01/01/1963	320	60		
2.0 – 3.0	B 00456	SANDOVAL	STK		0	0		
	B 00557	NEW MEXICO STATE HWY DEPT	PUB		0	0		
	B 00997	MARQUEZ	MUL		0	0		
	B 01104	SANDOVAL	DOM	04/02/1986	303	247	4.0	12.0
	B 01190	MARQUEZ	STK	08/31/1989	390	37		15.0
3.0 – 4.0	SD 00966	PENA	IRR		0	0		
	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	20.0
	B 00415	NEW MEXICO E.I.A.	DOM	03/23/1978	32	15	5.0	10.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/10/1977	95	72	5.0	2.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/11/1977	90	73	5.0	10.0
	B 00415	NEW MEXICO E.I.A.	DOM	08/12/1977	80	74	5.0	1.0
	B 00544	MARQUEZ	SAN	06/17/1978	68	30	6.63	8.0
	B 00659	GARCIA	DOM	01/18/1979	220	190		15.0
	B 00861	SANDOVAL	DOM		0	0		
	B 01085	FERNANDEZ COMPANY LTD.	IRR		0	0		
	B 01086	FERNANDEZ COMPANY	STK	01/01/1947	210	20		
	B 01115	MARQUEZ	DOM	07/21/1986	478	204	4.0	30.0
	B 01442	FERNANDEZ COMPANY, LTD. EXP		06/15/2000	620	87	12.75	1010.0
	B 01442	FERNANDEZ COMPANY, LTD. EXP		05/28/2002	1150	107	8.63	340.0

Ms. LaDonna Turner
 Pre-CERCLIS screening assessment of the Johnny M mine (Grants Mining District), McKinley County, New Mexico
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Distance from Site (miles)	OSE record number	Owner's last name	use	finish date	depth of well (ft)	depth to water (ft)	casing diameter (in.)	yield (gpm)
	B 01636	GARCIA	DOM	05/10/2005	260	80	4.0	5.0
	RG 43456	FERNANDEZ COMPANY	STK	01/01/1935	300	0		
	RG 43457	FERNANDEZ COMPANY	DOM	01/01/1967	320	50		

DOM -- 72-12-1 DOMESTIC ONE HOUSEHOLD
 DEW -- DEWATERING WELL
 EXP -- EXPLORATION
 IRR -- IRRIGATION
 MIN -- MINING OR MILLING OR OIL
 MON -- MONITORING WELL
 MUL -- 72-12-1 MULTIPLE DOMESTIC HOUSEHOLDS
 PUB -- 72-12-1 CONSTRUCTION OF PUBLIC WORKS
 STK -- 72-12-1 LIVESTOCK WATERING

Site ownership and Potential Responsible Parties

After discovery of the ore body in 1968, Harrison Western Corporation sunk a shaft between 1972 and 1973. The mine was operated by Kop-Ran Development Corporation and Ranchers Exploration and Development between 1976 through 1982. Hecla Mining Company was the successor to Rancher's interests in the Site prior to April 2, 1985 (Ref. 16). The last recorded Site operator was Newmont Mining Company.

The mineral rights were held by the Santa Fe Railroad in 1982 (Ref. 17). Subsequently Newmont Mining Company acquired these mineral rights when sold by Santa Fe Railroad (Ref. 18). The surface is currently owned by Fernandez Company Limited and Floyd Lee Ranch. According to Mr. Lee, new mining claims have been staked on the Site in recent years.

File review:

Files that were reviewed for this assessment are listed below.

Site reconnaissance:

Personnel from NMED and the New Mexico Energy, Minerals, and Natural Resources Department conducted a Site reconnaissance on July 26, 2010; Mr. Harry Lee accompanied state personnel to the head of valley in which the Site is located. All gamma readings shown on the figure accompanying this report were made with a Ludlum 14-C analog scintillometer (serial number 194209) with an uncollimated Ludlum 44-2 gamma detector (serial number PR241278), for which readings are recorded in counts per minute ("cpm"). Contact readings from this instrument ranged from 2800 cpm on the access road at the head of the valley above the minesite, to 260,000 cpm on the graded area near the mouth of valley. The ground surface at the Site was very wet from heavy rainfall that had occurred during days prior to the Site reconnaissance, and additional rain occurred sporadically throughout the Site visit. According to a representative from Ludlum, such environmental conditions could cause readings from the instrument to be higher than would otherwise occur under dry conditions. Additional elevation of readings also may occur due to radioactivity "shine" caused by topographic conditions or nearby radioactive sources. As further evidence of these potential effects upon the data herein reported, a grab sample of soil from Geographic Positioning Station ("GPS") 14, shown on the accompanying figure, was collected in a ziplock bag, allowed to desiccate for a day, and then another scintillometer reading was taken of the sample. The reading in the field at the location of this sample was 120,000 cpm; the reading from the sample was 12,000 cpm.

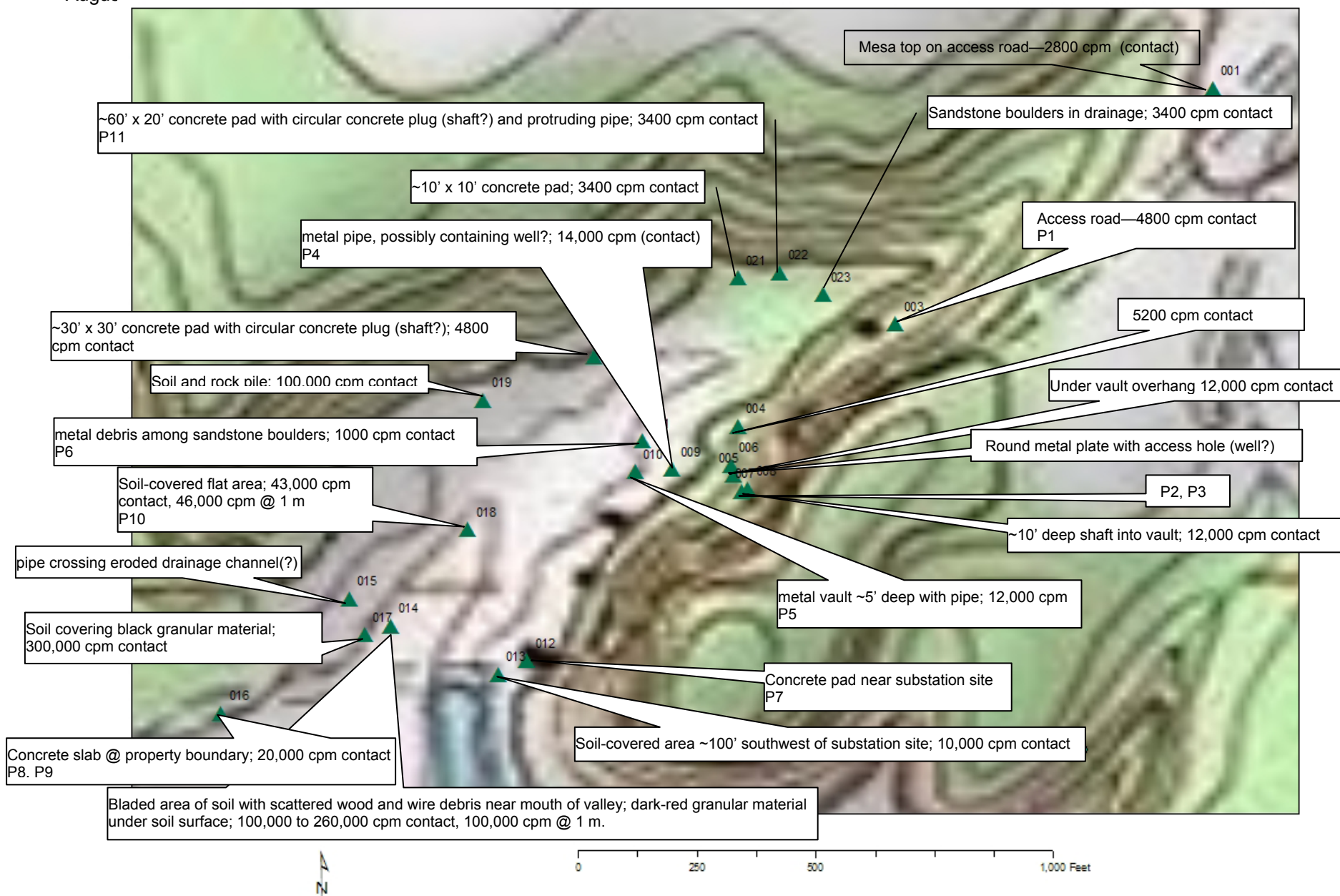
During the Site reconnaissance, State personnel also viewed the location of a nearby incomplete mine shaft that originally had been sunk by the Kerr-McGee Corporation on the Floyd Lee Ranch; this shaft has been converted into a water well.

According to Mr. Lee, all possible accesses to ground water in the vicinity of the Site and including those on the Site have been sampled recently by Strathmore Minerals Corporation as part of its baseline data collection for the proposed Roca Honda mine.

Recommendation:

Additional investigation of the Site is recommended to determine if any impacts or conditions exist that would pose threats to human health and the environment, especially the presence of unexploded blasting caps. NMED recommends performance of a radiological Site survey under drier environmental conditions than prevailed at the time of NMED's reconnaissance in order to identify any areas of unacceptably high radiation that may have developed since completion of earlier Site surface reclamation. The area of radiological survey should include the drainage or ditch leading from the Site in order to assess the potential for dispersal of Site-derived waste materials.

Currently, the existence of regional impacts from legacy uranium sites to the ground water system has not been determined. Ground water impacts from "wet" mines such as this Site may have caused contamination to both sediments and the surface water system, which subsequently propagate to the alluvial and underlying bedrock ground water systems. Such impacts to the ground water system may both occur and propagate over widespread areas, and could be difficult to distinguish from impacts from numerous other legacy uranium sites throughout the Grants Mining District. A generalized investigation of ground water impacts from "wet" former uranium mines throughout the Grants Mining District is recommended as part of the overall characterization of ground water quality in the Grants Mining District.



Observations from 07/26/2010 Site reconnaissance of Johnny M minesite



P1: View of vault to southwest from access road



P2: View to west side of valley from above vault overhang



P3: View to east of utilities entering vault below through escarpment



P4: Metal pipe, possibly containing well



P5: ~5-ft deep vault with piping



P6: Metal debris among sandstone boulders



P7: Former substation location with 5 transformer pads



P8: View to south of concrete slab along drainage



P9: View to north along drainage towards head of valley and minesite



P10: View of vault entrance toward northeast



P11: Concrete pad with circular concrete plug and protruding pipe



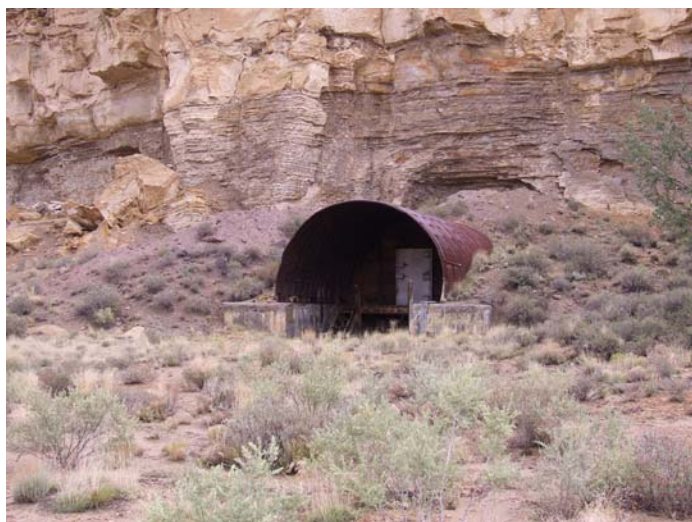
P12: View north toward head of valley



P13: View south from mouth of valley toward San Mateo Creek



P14: View into a metal circular vault



P15: View into metal overhang showing platform and vault door



P16: View toward southeast of valley

1. McLemore, Virginia T. and William L. Chenoweth, December 1991 (revised). "Uranium mines and deposits in the Grants district, Cibola and McKinley counties, New Mexico."
2. Kelly, T.E.; Link, Regina; and Schipper, Mark, 1980. "Effects of uranium mining on ground water in Ambrosia Lake area, New Mexico." New Mexico Bureau of Mines and Mineral Resources Memoir 38.
3. Discharge plan for the Johnny M Mine (undated).
4. State of New Mexico Environmental Improvement Division, June 16, 1978. Letter to Ranchers Exploration and Development Corporation).
5. State of New Mexico Environmental Improvement Agency, June 22, 1977. Letter to Ranchers Exploration and Development Corporation).
6. Ranchers Exploration and Development Corporation, undated. "E.I.A." [Environmental Impact Assessment]. Received by New Mexico Environmental Improvement Division on August 20, 1980.
7. Hall, Ramon E. (Director, Uranium recovery field office, Division of radiation safety and safeguards [NRC?], December 21, 1990. "Subject: Termination of the source material license issued to Hecla Mining Company for the Johnny M mine, San Mateo, New Mexico." Memorandum to William Brown (Regional Counsel, Region IV [NRC?]).
8. New Mexico Health and Environment Department, July 1980. "Water quality data for discharges from uranium mines and mills in New Mexico."
9. Ranchers Exploration and Development Corporation, January 14, 1982. Letter to New Mexico Environmental Improvement Division.
10. State of New Mexico Environmental Improvement Division, July 19, 1982. Memorandum to file.
11. Miera, Felix R. (NMEID Program Manager, Uranium licensing section), April 2, 1985. Letter to Ms. Colleen Kelley (Environmental Supervisor, Hecla Mining Company). Notice of indefinite extension of Radioactive Material License NM-RED-MB-15 for the Johnny M Mine.
12. Hicks, Randy, September 29, 1982. Letter to Ms. Iona Lee (Lee Ranch)
13. Sares, Steven, (NMED), October 2, 1985. Letter to Colleen D. Kelley (Environmental Supervisor, Hecla Mining Company).
14. Nuclear Regulatory Commission, May 24, 1993. Letter to Hecla Mining Company.
15. New Mexico Office of the State Engineer. "May_06_wells." Shapefile.
16. White, Michael B. (Counsel and Assistant Secretary, Hecla Mining Company), April 18, 1985. Letter to Felix R. Miera, Jr. (Program Manager, Uranium Licensing Section, New Mexico Environmental Improvement Division).
17. Rosel, James M. (Assistant Vice President and Assistant Secretary for Ranchers Exploration and Development Corporation), April 13, 1982. Letter to Randy Hicks (NMEID).
18. New Mexico Energy, Minerals and Natural Resources Department, August 16, 2010. "RE: section 32 mine-MARP Prior Rec files." Emailed edits from Susan Lucas-Kamat (NMEMNRD) to David L. Mayerson (NMED).